Defining Disaster

Dr Elisabetta Groppelli

Public Health England, UK and Sierra Leone
University of Leeds, UK
What Disaster?

Lessons from overseas crises and conflicts
Defining crises

Unforeseen event that threatens the public

- Unforeseen: cannot predict *when* it happens (sudden) and *what* (details) will happen
- Type of the event: Natural and/or Man-made
- Type of primary and secondary threats:
  - **Non-Medical**: food, water, electricity supply; infrastructures, incl housing, sanitation, communications (roads, trains, airports; information sharing)
  - and/or **Medical**: trauma; risk of infections; pregnancies; chronic conditions
- Public (scale): local, national, global
- Response & Timings:
  - rapid response required (emergency, level of) or sustained (months, years)
  - national and/or international aid
  - government and non-government organisations (NGOs)
Typhoon Yolanda, 2013

- Philippines, 8 November 2013
- Natural Disaster: Tropical Cyclone, Super Typhoon with severe storm surges that travelled through the Eastern and Western Visaya Region of the Philippines
- 1st threat: non-medical
- 2nd threat: medical
- Scale:
  - National
  - 6,300 deaths / 28,700 injuries
  - $2 billion lost infrastructure, social costs
- Timings & response:
  - Rapid response required
  - Direct financial aid and material support from 37+ countries
  - NGO support (mainly acute health care) from 200+ organisations
Typhoon Yolanda
Typhoon Yolanda
Gorkha Earthquake, 2015

- Nepal, 25th April 2015
- Natural Disaster: Earthquake epicenter in the Gorkha district (East of Kathmandu). Avalanches (incl. Mount Everest and Langtang valley)
- 1st threat: non-medical; 2nd threat: medical
- Scale:
  - National
  - ~9,000 deaths / 22,000 injuries/3.5 million homeless
  - > $10 million lost infrastructure, production and direct societal / social costs
- Timings & Response:
  - Rapid Response required
  - International support from governments and NGOs
lessons from overseas crises and conflicts
Tohoku Earthquake and Fukushima Dai’ichi NPP

- Japan, 11 March 2011: the Tōhoku earthquake triggered a tsunami that hit the Fukushima Nuclear Power Plant
- Natural Disaster followed by man-made Disaster
- 1\(^\text{st}\) threat: non-medical
- 2\(^\text{nd}\) threat: medical (Radiation poisoning)
- Scale:
  - National
  - ~16,000 deaths/ 6,100 injured / 2,500 missing
  - 30,000 people were evacuated / 228,000 relocated
  - No deaths due to deterministic radiation injury occurred
  - Stochastic (long term) radiation injury deaths are likely to be statistically undetectable
lessons from overseas crises and conflicts
The civil war in Syria

- Began with protests in March 2011 escalating through 2012/13
- Man-Made Disaster
- Threats: medical (war casualties, risk of chemical and biological weapons); non-medical
- Scale:
  - National + Middle East + Europe + Russia
  - On-going, 5 year conflict:
    - 250,000 deaths
    - 11 million people displaced: 4.5 m fled Syria, 6.5 m internally displaced
- Timings&Response:
  - Sustained
  - Government: armed intervention
  - NGO: Humanitarian
Case Study:
The Ebola outbreak
Ebola Outbreak in West Africa 2013/16

- 8 August 2014 - 29 March 2016
- the most severely affected countries, Guinea, Sierra Leone and Liberia
- 28,657 reported confirmed, probable, and suspected cases
- 11,325 reported deaths (40% case-fatality rate)

**PUBLIC HEALTH EMERGENCY OF INTERNATIONAL CONCERN - PHEIC -**
Ebola Outbreak in West Africa 2014/16

How did the Ebola Outbreak become a crisis (a PHEIC)?

Cause + Context
The VIRUS

- Ebola is a highly contagious virus
- Ebola spreads through human-to-human transmission via direct contact with bodily fluids of infected people
- Outbreak virus = 1976 virus
Ebola – The Human Context I

• Close interaction with animals that are source of virus: fruit bats are natural Ebola virus hosts. Ebola is introduced into the human population through close contact with bodily fluids of infected animals such as non-human primates, fruit bats, forest antelope etc found ill or dead in the rainforest.
Ebola – The Human Context II

• Internal migration to city (capital Freetown): crowded living conditions with no/poor sanitation
Ebola – The Human Context III

Weak preparedness linked to a weak health care system

- Disease surveillance: trained clinicians + diagnostics
- Facilities: hospitals, clinics
- Coordination and Leadership
• **Culture**: burial ceremonies in which mourners have direct contact with the body of the deceased person play an important role in the transmission of Ebola.
Ebola – The Human Context V

Human Travel: where we go, our bugs go too
Ebola: risk of a GLOBAL crisis

Human Travel: where we go, our bugs go too
Ebola: risk of a GLOBAL crisis

Gomes et al., 2014 PLoS Curr Outbreaks
Ebola declared a PHEIC by WHO:

West African countries health systems are **fragile** with significant deficits in **human, financial and material resources**, resulting in compromised ability to mount an adequate Ebola outbreak control response;

**inexperience** in dealing with Ebola outbreaks; misperceptions of the disease, including how the disease is transmitted, are common and continue to be a major challenge in some communities;

a high number of infections have been identified among **health-care workers**, highlighting inadequate infection control practices in many facilities.

high **mobility of populations** and several instances of cross-border movement of travellers with infection;

**several generations of transmission** have occurred in the three capital cities of Conakry (Guinea); Monrovia (Liberia); and Freetown (Sierra Leone)
Ebola – The International Response

Image: NATO ship and aircraft supporting the Ebola response.

Image: UK aid from the British people.

Image: Medical team at the forefront of the response.

Image: Laboratory team working on Ebola research.

Image: Armed forces supporting the response effort.
Ebola – The International Response

Ebola Treatment Centre (ETC)

Makeni ETC – Bombali - IMC
Secondary Threats

Freetown Flooding: a disaster within a disaster
• September 2015
• Threats:
  • spread of infections, not just Ebola, but also Cholera
  • Impairment of Ebola Outbreak response (PHE labs)
Ebola: Human Travel - where we go, our bugs go too.
Ebola – end of this outbreak

End of WHO PHEIC: 29th March 2016

End of human-to-human transmission:
  • Sierra Leone: 17th March 2016
  • Guinea: 1st June 2016
  • Liberia: 9th June 2016
Ebola – lessons from this outbreak

Local/national threats can become global threats

Need to strengthen locally to avoid global scale: Establish preparedness for Medical and non-medical emergencies : coordinate efforts and leadership amongst Ministry of Health and Sanitation, Ministry of Defence, Office of National Security.

International organisations (WHO, CDC, PHE) to support and facilitate resilience

Human engagement: Western medicine, science and resources, although necessary, are powerless without engagement at a cultural and human level.

Science & Development:

- Availability of emergency funding and quick protocols for development
- Redefining priorities (high risk viruses): Local = Global. Viruses are as geographically distributed as their hosts.
Ebola – lessons from this outbreak

DISASTER RESILIENCE

Ability to respond, mitigate and recover from a disaster

Nigeria and Ebola

The Role of the Polio Program Infrastructure in Response to Ebola Virus Disease Outbreak in Nigeria 2014

Rui Gama Yaz1, Pascal Mkandawire2, Richard Banda1, William Komkech1, Olubowale O. Ekundare-Famiyesin1, Rosemary Onyibe1, Sunday Obidoye1, Peter Nsibuga3, Sylvester Maleghemi3, Bolatito Hannah-Murele1 and Sisay G. Tegegne1

California wildfire, today.
The fire covers more than 22,000 acres and residents of about 1,500 homes near Santa Clarita have been evacuated; 18 houses burnt down.
Disaster

A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

Comment: Disasters are often described as a result of the combination of: the exposure to a hazard; the conditions of vulnerability that are present; and insufficient capacity or measures to reduce or cope with the potential negative consequences. Disaster impacts may include loss of life, injury, disease and other negative effects on human physical, mental and social well-being, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation.

30 Aug 2007
Crisis phases and compounding elements

The common phases:
• Recognition
• Response to acute needs
• Stabilisation
• Restoration and recovery

Compounding elements:
• Additional insults
• Secondary insults
• Unusual insults
• Primary and secondary resource depletion
• Loss of resilience
• Interference
Haiti Cholera Outbreak, 2010

- Haiti, from October 2010. 10 months after major earthquake
- Natural Disaster: cholera (V. cholerae)
- 1st threat: medical
- National
  - ~4,000 deaths (March 2011)
- Timings & Response:
  - Rapid Response required
  - International support from governments and NGOs
Black Death (C14th-1959)

Many small outbreaks of plague documented between the C6th A.D. and the C14th

Often been associated with increases in global trade and population movements

C14th Europe suffered the largest outbreak of plague in history with a fatality thought to be over 25 million people (25% of the population).

Clinically probably bubonic, septicaemic and pneumonic plague – but ‘flu is also a good fit

Last pandemic arising from China in 1855, and spreading through Africa, Asia and South America and the US

The Great Plague of London (1665–66) was the last major outbreak in Europe
Spanish Flu (1918) – ‘Flu (H1N1)

An old disease and well described in 421 B.C. by Hippocrates

Reports of recurrent epidemics from the end of the C16th.

Last high mortality pandemic identified in March 1918 at a US military camp in Kansas, with cases reported from all continents, within 6 months

≈1 billion people (50% of the global population at the time) suffered clinical infection

≈ 20 - 100 million fatalities
Freetwoon: Flooding and EBOLA... and cholera... and malaria... etc
Sierra Leone

Nigeria: Polio Eradication Initiative provided expertise, log support and framework to deal with EBOV outbreak